

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (original) A closed-loop method for the manufacture of foamed polymeric material, comprising:

exposing an article of raw polymeric material at elevated pressure to a non-reacting gas which is soluble in the polymer for a time sufficient to achieve a desired concentration of gas within the polymer, thereby forming an exposed polymeric article which is at least partially gas-saturated;

decompressing the exposed polymeric article;

foaming the article at a temperature equal to or above the glass transition temperature of the gas-saturated article but below the melt temperature of the polymeric material; and

trimming the foamed article to produce finished foamed polymeric material and scrap solid state process foamed polymer,

wherein the raw polymeric material comprises 5% to 100% of any one of the group consisting of recycled pre-consumer polymer, recycled post-consumer polymer and scrap solid state process foamed polymer.

2. (original) A closed-loop method for the manufacture of foamed polymeric objects, comprising:

exposing an article of raw polymeric material at elevated pressure to a non-reacting gas which is soluble in the polymer for a time sufficient to achieve a desired concentration of gas within the polymer, thereby forming an exposed polymeric article which is at least partially gas-saturated;

decompressing the exposed polymeric article;

at least partially foaming the article at a temperature equal to or above the glass transition temperature of the gas-saturated article but below the melt temperature of the polymeric material; and

forming and trimming the foamed article to produce foamed polymeric objects and scrap solid state process foamed polymer,

wherein the raw polymeric material comprises 5% to 100% of any one of the group consisting of recycled pre-consumer polymer, recycled post-consumer polymer and scrap solid state process foamed polymer.

3. (original) A closed-loop method for the manufacture of foamed semi-crystalline polymeric objects from an article of raw polymeric material, comprising:

exposing the article at elevated pressure to a plasticizing gas for a time sufficient to achieve a desired concentration of gas, and to increase the level of crystallinity at the surfaces, thereby forming an exposed polymeric article which is at least partially gas-saturated, having a lower level of crystallinity in its core and a higher level of crystallinity at the surfaces;

decompressing the exposed polymeric article;

at least partially foaming the article at a temperature equal to or above the glass transition temperature of the gas-saturated article but below the melt temperature of the polymeric material; and

forming and trimming the foamed article to produce foamed polymeric objects and scrap solid state process foamed polymer,

wherein the raw polymeric material comprises 5% to 100% of any one of the group consisting of recycled pre-consumer polymer, recycled post-consumer polymer and scrap solid state process foamed polymer.

4. (canceled)

5. (original) A method according to claim 1, claim 2, or claim 3, wherein the temperature at which the article is exposed to elevated pressure is sufficiently low and the pressure of non-reacting gas to which the article is exposed is sufficiently high that the temperature at which foaming starts is below the glass transition temperature of the unsaturated polymer.

6. (original) A method according to claim 1, claim 2, or claim 3, wherein the temperature at which the article is exposed to elevated pressure is sufficiently low to enhance the foaming of the polymer, thereby reducing the density of the resultant foam.

7. (original) A method according to claim 1, claim 2, or claim 3, further comprising reprocessing substantially all of the scrap solid state process foamed polymer to make raw polymeric material for further closed-loop manufacture of foamed material.

8. (original) A method according to claim 3, wherein the temperature at which the article is foamed is at or above that at which foaming occurs in the lower crystallinity core but below that at which foaming occurs in the higher level crystallinity surfaces.

9. (original) A method according to claim 2 or claim 3, further comprising applying additional heat to the object at a temperature below the melting temperature of the unsaturated polymer to raise the crystallinity level of the object.

10. (original) A method according to claim 2 or claim 3, further comprising applying additional heat to the object while it is still at least partially gas saturated to raise the crystallinity level of the object.

11. (original) A method according to claim 2 or claim 3, further comprising applying additional heat to the object to raise the crystallinity level of the surface of the foamed object to a level sufficient to increase the maximum operating or service temperature of the object.

12. (original) A closed-loop method for the manufacture of foamed polymeric material, comprising:

foaming raw polymeric material at a temperature below its melt temperature to produce solid state process foamed polymeric material, wherein the raw polymeric material comprises up to 100% of any one of the group consisting of recycled pre-consumer polymer, recycled post-consumer polymer and scrap solid state process foamed polymer.

13. (original) A method according to claim 1, claim 2, or claim 3, further comprising allowing desorption of some of the gas from the surface of the article after decompressing the article but prior to foaming the article.

14. (original) A closed-loop method for the manufacture of foamed polymeric objects from an article of raw polymeric material, comprising:

reversibly plasticizing and at least partially gas saturating the article by exposing the article at elevated pressure to a plasticizing gas for a sufficient period of time;

decompressing the exposed polymeric article;

at least partially foaming the article at a temperature below the glass transition temperature of the unexposed polymeric material; and

forming and trimming the foamed article to produce foamed polymeric objects and scrap solid state process foamed polymer,

wherein the raw polymeric material comprises 5% to 100% of any one of the group consisting of recycled pre-consumer polymer, recycled post-consumer polymer and scrap solid state process foamed polymer.

15 (new). A process for making a shaped article of manufacture from a sheet or roll of a thermoplastic material, wherein the thermoplastic material consists essentially of a virgin thermoplastic material admixed with a previously processed thermoplastic material, wherein the virgin material and the previously processed thermoplastic material are of the same chemical composition, and wherein the previously processed thermoplastic material is in an amount that ranges from about 5% to about 100% by weight of the thermoplastic material, the process comprising at least the following steps:

(a) pressurizing the sheet or roll of the thermoplastic material with a plasticizing gas under a selected pressure and period of time sufficient to yield a reversibly plasticized thermoplastic material, the plasticized thermoplastic material being impregnated with the plasticizing gas;

(b) depressurizing the plasticized thermoplastic material to thereby desorb some of the plasticizing gas from the plasticized thermoplastic material; and

(c) forming the plasticized thermoplastic material into the shaped article of manufacture, wherein the step of forming occurs before the impregnated plasticizing gas concentration falls below about 0.5 percent by weight of the plasticized thermoplastic material.

16. (new) The process of claim 15 wherein the thermoplastic material consists essentially of polyethylene terephthalate (PET).

17. (new) The process of claim 16 wherein the plasticizing gas is carbon dioxide (CO₂).

18. (new) The process of claim 17 wherein the shaped article has a width to depth ratio of greater than about 1:1.

19. (new) The process of claim 18 wherein the plasticized thermoplastic material has an impregnated plasticizing gas concentration ranging from about 2 to about 9 percent by weight.

20. (new) The process of claim 19 further comprising, prior to the step of forming, a step of heating the plasticized thermoplastic material to a temperature sufficient to cause softening and at least partial foaming, wherein the at least partial foaming generates a plurality of microcells within the plasticized thermoplastic material, and wherein the gas pressure within the plurality of microcells is above atmospheric pressure.

21. (new) The process of claim 20 wherein the step of forming occurs before the gas pressure within the plurality of microcells falls below atmospheric pressure.

22. (new) The process of claim 21 wherein the thermoplastic material consists essentially of polyethylene terephthalate (PET) and the plasticizing gas is carbon dioxide (CO₂).

23. (new) The process of claim 22 wherein the shaped article of manufacture has an outer skin layer and a foamed interior.

24. (new) The process of claim 23 wherein the shaped article of manufacture is a cup having a wall angle of less than about 35 degrees from vertical.

25. (new) The process of claim 15 wherein the selected pressure ranges from about 0.345 MPa to about 17.2 MPa, and the selected period of time ranges from about 3 hours to about 100 hours.

26. (new) The process of claim 15 wherein the shaped article of manufacture is unfoamed, and wherein the step of forming the gas impregnated thermoplastic material into the unfoamed shaped article of manufacture occurs while the plasticized thermoplastic material is under pressure of the plasticizing gas.

27. (new) A shaped article of manufacture made in accordance with claim 15.

28. (new) The process of claim 15 further comprising, after the step of forming, a step of additional heating to thereby increase the crystallinity level of the shaped article of manufacture.

29. (new) A shaped article of manufacture made in accordance with claim 15.